Remarks

Claims 1-24 are pending in the present application. No claims are amended herein.

Reconsideration of the claims and application are respectfully requested. Applicants respectfully submit that presently claimed invention would not have been obvious over the asserted combination of prior art, because the contended modifications of the Clothier et al. disclosure would result in a product which would no longer work for its intended purpose, that is, it would result in a non-functional product. Therefore, the asserted combination and modification cannot have rendered obvious the presently claimed invention.

Rejections of Claims over Clothier et al. in view of Asai And Tertiary References.

Claims 1, 10, 12-14, 21 and 24 stand rejected as obvious over Clothier et al., US 2002/0177006 in view of Asai et al., US 6240636. Claims 2-11, 15 and 18-22 stand rejected over Clothier and Asai, and further in view of Tamm, US 5666722. Claim 16 stands rejected over Clothier and Asai, and further in view of Konrad, US 2002/0129972. Claim 17 stands rejected over Clothier and Asai, and further in view of Yokogawa, US 6740416. Claim 23 stands rejected over Clothier and Asai, and further in view of Frank, US 5577309. Applicant respectfully traverses these rejections of the claims, and requests reconsideration and withdrawal of said rejections, for at least the following reasons.

Applicant respectfully submits that the references fail to disclose or suggest all of the features of claim 1 of the present application. Accordingly, there is no basis for a *prima facie* case of obviousness, and the rejections of Applicant's claims should be withdrawn. Applicants incorporate by reference herein the previously submitted arguments.

Response to Examiner's Arguments

The Examiner's responses to Applicants' arguments in the Office Action mailed 12 October 2010 fail to rebut Applicants' arguments. The presently claimed invention would not have been obvious over Clothier in view of Asai for the following additional reasons.

First, the Examiner responded to Applicants' argument that Clothier's base material is removed prior to finishing the final circuit by rationalizing that this step can be omitted because paragraph 49 of Clothier discloses "Next, the carrier foils 1 can be removed such as by etching in a suitable etchant." Thus, the Examiner interprets the "can be" in this sentence to mean that the removal of the carrier foils 1 is optional. Applicants respectfully submit that this is interpretation is clearly erroneous and without support of any evidence, much less substantial evidence. The "can be" does not mean the step is optional, it means that one way the carrier foil can be removed is by etching, and that other methods might be possible. Paragraph [0049] reads as follows:

> [0049] Next, the carrier foil 1 *can be* removed such as by etching in a suitable etchant (see FIG. 2g). The layer 2 such as the chromium acts as an etch mask to protect the underlying conductive material 5 during the removal of carrier foil 1. The layer 2 is a different material than foil 1 and conductive material 5. (Emphasis added.)

Quite clearly, this disclosure means that when the carrier foil 1 is removed, the removal *can be* carried out by a method such as etching in a suitable etchant, or by some other suitable method *This does not mean that the removal of the carrier foil 1 is optional.* Any such interpretation is without support of any evidence and is clearly erroneous. Fig. 2g, specifically referred to in [0049], shows that the carrier foil 1 has been removed. There is nothing anywhere in Clothier to suggest an embodiment in which the carrier foil 1 is not removed. There is no disclosure, no suggestion, nothing whatsoever in Clothier to suggest that removal of the carrier foil 1 might be optional. There is no illustration of such an embodiment. It is simply not there, and it is wrong for the Examiner to contend that such is possibly within the scope of the disclosure of Clothier. It is <u>not</u>.

In fact, paragraph [0048] describes the application of a layer 6 of a dielectric material such as a pre-preg, and states that the layer 6 also provides mechanical robustness needed for the following processing. Such following processing is described in the very next paragraph, i.e., [0049], which describes the removal of the

carrier foil 1. Without the carrier foil 1, in the absence of the layer 6, the layers remaining would have little if any robustness.

Further, as shown in Fig. 2h and described in paragraph [0050], following removal of layer 1 and addition of layer 6, even the layer 2 is removed. It would be impossible to remove the layer 2 if the layer 1 were still present. This is further evidence that Clothier fails to disclose or suggest any possibility that layer 1 might not be removed.

Furthermore, the same "*can be*" language in setting forth optional ways to carry out required steps is used throughout Clothier. These uses do not even remotely suggest that any of the steps described might be optional. See, e.g., [0040], "An example of a suitable electrically conductive layer 2 is chromium which *can be* deposited by sputtering or evaporation." See, e.g., [0042], "For example, any of the known techniques for laser ablating *can be* employed." See, e.g., [0045], "The top surface and circuit features *can* then *be* seeded (not shown) by depositing a relatively thin seed layer of a conductive metal." See, e.g., [0046], "The conductive film *can be* deposited by electroless plating, electroplating, sputter coating or evaporation techniques that are well known in the art." (Emphasis added in all instances.) None of these uses of "can be" in any way suggest that the step is optional. Rather, all imply that what follows are suggested examples, and that other ways are possible. The mere fact that the drafter of the Clothier specification used the terminology "can be" in enumerating ways to carry out required steps does not and cannot possibly convert those required steps into optional steps.

For the foregoing reasons, Applicants respectfully submit that the Examiner's arguments fail to rebut Applicants' arguments, that the interpretation asserted by the Examiner is clearly wrong and without support of any evidence.

Accordingly, the presently claimed invention cannot have been obvious over Clothier in view of Asai.

Second, when combining Clothier and Asai, the Examiner has failed to considered that Asai requires an outer copper layer 6 on the insulating resin layer 2, which are together bonded to the inner wiring pattern 3 and the inner resin layer 4. In contrast, the present invention starts with a printed circuit board and simply applies a dielectric – without further outer copper layer – on this printed circuit board.

Asai requires this outer copper layer to form circuitry strongly adhering to the outer layer of package to manufacture a multi-layer board (Asai: col. 6, lines 16-21). Therefore, since the outer copper layer 6 has strong bond strength to the outer layer of copper foil, the adhesion strength between the insulating resin layer 2 and the outer copper layer 6 is higher than the case where the outer copper layer 6 is electroplated directly to the resin layer 2. Adherence of the copper circuit traces on the dielectric is achieved with the present invention by embedding the circuit traces into the dielectric – adherence is a problem in the method of Asai, because the circuit traces in this case are formed on top of the resin layer.

For this additional reason, Applicants respectfully submit that the asserted combination of Clothier and Asai would not have rendered obvious the presently claimed invention.

Third, comparison of the teachings of Clothier and Asai clearly shows that the process of Clothier would be used to form the initial structure shown in Fig. 1 of Asai, and that combining Clothier with Asai would yield nothing more than Asai's own invention, and would not yield or even lead the person of ordinary skill to Applicants' claimed invention. The trenches formed by Clothier (which allegedly meet the limitations of Applicants' claims of forming trenches not extending completely through the dielectric layer to circuit traces) *are what is used to form the circuit traces!* One cannot do both. One cannot both form trenches into which circuit traces subsequently are to be formed and, at the same time, form the trenches to not reach the not-yet-formed circuit traces. It is illogical to contend this.

Thus, neither of Clothier nor Asai teaches forming trenches that do not reach circuit traces. In Clothier, there are no circuit traces, as admitted by the Office Action. In Asai, there are no trenches that do no reach the circuit traces. Combination of Clothier and Asai does not provide the missing elements, at least not without the aid of impermissible hindsight. There is nothing in the description of the formation of circuit traces in Clothier that would suggest modification of Asai's circuit boards to form trenches as well as the vias described by Asai. Clothier's "trenches" are formed before there are any circuit traces – in fact, Clothier's "trenches" are the very location into which the not-yet-formed circuit traces will be formed when they are later formed. In Asai, the circuit traces are already formed, but there is nothing

even remotely analogous to the step in Clothier of forming trenches except, as noted, in the process of forming the initial structure in Fig. 1 of Asai.

For this reason, the Office Action fails to state a proper *prima facie* case of obviousness, since the contended combination fails to show all the limitations of the claims. The best that one could get from the combined disclosures of Clothier and Asai is that Clothier teaches how to form the initial structure shown in the upper left of Fig. 1 of Asai. In other words, the disclosure of Clothier is relevant to an entirely different point in the formation of the structure of Asai, and there is nothing in either reference that discloses or suggests the claimed combination of steps.

Accordingly, the presently claimed invention cannot have been obvious over Clothier in view of Asai.

CONCLUSION

Claims 1-24 are believed to be in condition for allowance. Notice to such effect is respectfully requested.

In the event any issues remain in the application, or if the Examiner considers that a telephone interview would facilitate the examination process, Applicant's undersigned attorney invites the Examiner to telephone him at the Examiner's convenience.

The fee for two additional total claims is submitted herewith. In the event any other additional fees are due in connection with the filing of this document, the Commissioner is authorized to charge those fees to our Deposit Account No. 18-0988 under Attorney Docket No. **EFFEP0101US**.

Respectfully submitted,
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